GLF Integrated Power Inc.

Efficient Protected Power

A Silicon Valley IC Company with Leading Technology

April 26, 2017
Company Introduction

• GLF Integrated Power Inc. is a fabless semiconductor company founded in Feb. 2013 in Silicon Valley, dedicated to develop high efficiency power protection IC.
• First product focused on Load Switch application released in 2015
• First customer was acquired in 2015
• A wholly Owned subsidiary company was opened in June, 2016 in Chengdu, China.

• GLF Technology Vision
  We provide the best-class ultra efficient power protection technology for IoT, Wearable, Mobile, Smart Card, Computing, Storage, Communications and Industrial Devices.
The Market “Pain” and Opportunity

Pain

• An absence of Integrated Power Protection solution limits the development of Industrial/Commercial IoT due to reliability, size, and cost of discrete solutions

Opportunity

• Safety, power loss (excess heat) and battery life concerns will drive adoption of new/unique ultra-efficient power protection technologies

Why GLF?

• The unique team expertise and IP portfolio focused on low resistance switches, transient and ESD etc. Semiconductor protection solutions.
• Custom Design Strength
• Cost Processes
• Balanced Cost, Efficiency, Robustness

GLF Power System Protection
Power management
GLF Power Preservation
New Complete Power Solution

Images owned by their respective sources
## Product & Applications

<table>
<thead>
<tr>
<th></th>
<th>Mobile Device</th>
<th>Sensor / IoT</th>
<th>Wearables</th>
<th>Storage</th>
<th>Server / Data Center</th>
<th>Industrial Protection</th>
<th>Smart Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Switch</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Battery Protection</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>System Protection</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Power Multiplex</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EFuse</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
# Competitive Advantages

<table>
<thead>
<tr>
<th>GLF Technology</th>
<th>Power Switch</th>
<th>Power MUX Switch</th>
<th>EFuse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lowest “On” current consumption</td>
<td>Lowest “On” current consumption</td>
<td>Ultra lower $I_q$ per GLF patent</td>
</tr>
<tr>
<td></td>
<td>Lowest “OFF” current consumption</td>
<td>Lowest “OFF” current consumption</td>
<td>Adding HV Surge &amp; ESD Protection</td>
</tr>
<tr>
<td></td>
<td>Best cost structure due to proprietary process</td>
<td>Surge Protection</td>
<td>System protection module for Industrial like Avionic System</td>
</tr>
<tr>
<td></td>
<td>Ultra thin package 0.35mm available</td>
<td>4A per channel capability for industrial application</td>
<td></td>
</tr>
</tbody>
</table>

## Current Competitors

**Disadvantages Upto:**

- 700X “ON” Power consumption ($I_O$)
- 100X “OFF” Current consumption ($I_{SD}$)
- 2X Resistance/“ON” Power losses ($R_{ON}$)
- No IC package thinner than 0.4mm

- **Main Players:** TI, Toshiba, On-Semi

- **Higher Ron & Power Consumption**
- **Only 2A current per channel in market**
- **No Surge Protection**

- **Main Players:** TI, On-Semi

## Upcoming Competitors

- No New Players
- Mature industry
- No disruptive technologies
- Performance vs Cost

- No New Players
- Mature industry
- No disruptive technologies
- High entry barrier

- New players are interested in “White Label” product partnership with GLF
# Expanding Product Portfolio

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Description</th>
<th>Product Name</th>
<th>Operating Specs</th>
<th>I₂Smart™ Efficiency Specs</th>
<th>Integrated Features</th>
<th>Package</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Switch</td>
<td>Best efficiency, Ultra-thin and FastRaise options</td>
<td>GLF71301</td>
<td>6</td>
<td>5.5</td>
<td>DC Voltage 1.5</td>
<td>VOP Typ. 34</td>
<td>I₂ Typ. 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GLF71301T</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GLF71307</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High Efficiency</td>
<td>GLF71311</td>
<td>2</td>
<td>31</td>
<td>DC Voltage 7</td>
<td>VOP Typ. 25</td>
<td>I₂ Typ. 19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GLF71311T</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lowest R_{on}</td>
<td>GLF71321</td>
<td>4</td>
<td>15</td>
<td>DC Voltage 3</td>
<td>VOP Typ. 45</td>
<td>I₂ Typ. 45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GLF71325</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lowest I_{SD}</td>
<td>GLF71321</td>
<td>4</td>
<td>18</td>
<td>DC Voltage 1</td>
<td>VOP Typ. 16</td>
<td>I₂ Typ. 16</td>
</tr>
<tr>
<td></td>
<td>3-Channel</td>
<td>GLF71325</td>
<td>4</td>
<td>18</td>
<td>DC Voltage 1</td>
<td>VOP Typ. 16</td>
<td>I₂ Typ. 16</td>
</tr>
<tr>
<td>Battery Protection</td>
<td>Accurate Off-threshold</td>
<td>GLF73510</td>
<td>6</td>
<td>4.2</td>
<td>DC Voltage 2</td>
<td>VOP Typ. 39</td>
<td>I₂ Typ. 39</td>
</tr>
<tr>
<td>Power Multiplex (Mux)</td>
<td>2 inputs, 1 output</td>
<td>GLF741xx</td>
<td>6</td>
<td>5.5</td>
<td>DC Voltage 2</td>
<td>VOP Typ. 39</td>
<td>I₂ Typ. 39</td>
</tr>
<tr>
<td>System Protection</td>
<td>LS with Reset Timer</td>
<td>GLF76121/L</td>
<td>6</td>
<td>5.5</td>
<td>DC Voltage 1.5</td>
<td>VOP Typ. 32 @3.6V</td>
<td>I₂ Typ. 2 @3.6V</td>
</tr>
<tr>
<td></td>
<td>LS with Deep Sleep</td>
<td>GLF76321/L</td>
<td>6</td>
<td>5.5</td>
<td>DC Voltage 1.5</td>
<td>VOP Typ. 32 @3.6V</td>
<td>I₂ Typ. 2 @3.6V</td>
</tr>
</tbody>
</table>

NOTE: Spec values & features set for "Coming Soon" and "Development" devices are provided on a best estimate basis, based on available data at time of estimate. Values are subject to change.

"Integrated Features" Table Key: √ = Feature included, P = Programmable Feature
Typical functional diagram

Smart Card Solutions
Some of the GLF products available in 0.35mm thickness WCSP package

0.77mm x 0.77mm x 0.35mm
0.4mm Pitch
WCSP

0.97mm x 0.97mm x 0.35mm, 0.5mm Pitch
WCSP

0.77mm x 0.77mm x 0.35mm
0.4mm Pitch
WCSP

Some of the GLF products available in 0.35mm thickness WCSP package
The release of GLF’s products in APEC 2016 were reported by 13 electronics industry professional media reports, and many other US news media, totally 213 reports or references, including the famous mainstream media Bloomberg, Yahoo Finance, New York Business Journal, Boston Business Journal…

EDN/Planet Analog #2 “Must-Have” Innovation at APEC 2016.

Steve Taranovich praises GLF as a start-up with a great idea backed by a talented team.

Steve Taranovich, Senior Editor

“This is a good load switch story, and I NEVER thought I would say that about a Load Switch”

Aimee Kalnoskas, Editor

“This is the 1st memorable load switch”

David Morison, Founder & Editor

GLF71311 given “Today’s Top Stories” status on Powerpulse.net
Thank You